

INPLASY PROTOCOL

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Conflicts of interest:
None declared.

Meta analysis of the effect of adipose derived stem cells on bone defects in rabbits

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Review question / Objective: Bone defect is a common and frequently occurring disease in orthopedics clinic. It is more common that bone defect is caused by trauma, infection, compression fracture caused by senile osteoporosis, bone tumor resection and revision after joint replacement. The traditional bone defect treatment methods include autologous bone transplantation and allogeneic bone transplantation, bone grafting and lengthening, and induced membrane technology. Traditional bone defect treatment methods have their own advantages and disadvantages. Most of the traditional bone defect treatment technologies have certain problems, and often can not achieve the expected hope. With the development of economy, the traditional bone defect treatment technology has been unable to meet people's needs. The emergence of tissue engineering bone technology has opened a new idea for the treatment of bone defects. The research on adipose stem cells in the treatment of bone defects is increasing, but it is still in the stage of animal experiments. Therefore, this study uses evidence-based medicine methods to systematically evaluate the efficacy of adipose derived stem cells in repairing bone defects, in order to provide some reference value for the clinical application of adipose derived stem cells in repairing bone defects.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 06 July 2022 and was last updated on 06 July 2022 (registration number INPLASY202270031).

INTRODUCTION

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common that bone defect is caused by trauma, infection, compression fracture caused by senile osteoporosis, bone tumor resection and revision after joint replacement. The traditional bone defect

treatment methods include autologous bone transplantation and allogeneic bone transplantation, bone grafting and lengthening, and induced membrane technology. Traditional bone defect treatment methods have their own advantages and disadvantages. Most of the traditional bone defect treatment technologies have certain problems, and often can not achieve the expected hope. With the development of economy, the traditional bone defect treatment technology has been unable to meet people's needs. The emergence of tissue engineering bone technology has opened a new idea for the treatment of bone defects. The research on adipose stem cells in the treatment of bone defects is increasing, but it is still in the stage of animal experiments. Therefore, this study uses evidence-based medicine methods to systematically evaluate the efficacy of adipose derived stem cells in repairing bone defects, in order to provide some reference value for the clinical application of adipose derived stem cells in repairing bone defects.

Rationale: Adipose stem cells have the potential to differentiate into fat, bone, cartilage, muscle, endothelium, hematopoietic, liver, islet and nerve cells, and are ideal seed cells due to their wide distribution in vivo, small trauma in sample selection and large quantity of cells. In the research of adipose stem cells, the earliest, most studied and the result is relatively positive is the induction differentiation toward osteogenesis. At present, adipose stem cells have attracted more and more attention due to their advantages and become the hot seed cells in bone tissue engineering research. Bone defects are common clinical diseases and frequently occurring in orthopedics. The bone defects caused by trauma, infection, compression fracture caused by senile osteoporosis, bone tumor resection and revision after joint replacement are more common. The traditional methods of bone defect treatment include autograft and allograft, bone lengthening and induction membrane technique. Although the traditional bone defect treatment technology is improving, most of them

have some defects. With the continuous development of economy, it can not meet the needs of people more and more. The emergence of tissue engineering bone technology opens a new idea for the treatment of bone defect.

Condition being studied: In the early stage, I have learned a lot of knowledge about adipose stem cells and meta-analysis methods and key points. At present, I have read a lot of relevant literature on this topic and can skillfully operate the relevant software required for meta-analysis.

METHODS

Search strategy: Pubmed: (("Adipose Tissue-Derived Mesenchymal Stem Cell") OR ("Adipose Tissue-Derived Mesenchymal Stem Cells") OR ("Adipose Derived Stem Cells") OR ("Adipose Derived Stem Cell")) AND (("bone repair") OR ("bone repairs") OR ("bone regeneration") OR ("Fracture Healing"))

Cochrane: Search Hits

#1 ("Adipose Tissue-Derived Mesenchymal Stem Cell"):ti,ab,kw (Word variations have been searched) 39

#2 ("Adipose Tissue-Derived Mesenchymal Stem Cells"):ti,ab,kw (Word variations have been searched) 39

#3 ("Adipose Derived Stem Cells"):ti,ab,kw (Word variations have been searched) 174

#4 ("Adipose Derived Stem Cell"):ti,ab,kw (Word variations have been searched) 174

#5 ("bone repair"):ti,ab,kw (Word variations have been searched) 103

#6 ("bone repairs"):ti,ab,kw (Word variations have been searched) 102

#7 ("bone regeneration"):ti,ab,kw (Word variations have been searched) 1130

#8 ("Fracture Healing"):ti,ab,kw (Word variations have been searched) 1550

#9 #1 OR #2 OR #3 OR #4 212

#10 #5 OR #6 OR #7 OR #8 2704

#11 #9 AND #10 3

Embase: ('adipose tissue-derived mesenchymal stem cell':ab,ti OR 'adipose tissue-derived mesenchymal stem cells':ab,ti OR 'adipose derived stem cells':ab,ti OR 'adipose derived stem cell':ab,ti) AND ('bone repair':ab,ti OR 'bone

repairs':ab,ti OR 'bone regeneration':ab,ti OR 'fracture healing':ab,ti)

知网: (TKA % '脂肪干细胞' OR TKA % '脂肪间充质干细胞') AND (TKA % '骨修复' OR TKA % '骨再生' OR TKA % '骨折愈合')

万方: 题名或关键词:(("脂肪干细胞") or 题名或关键词:(("脂肪间充质干细胞")) and 题名或关键词:(("骨修复") or 题名或关键词:(("骨再生") or 题名或关键词:(("骨折愈合"))

维普: ((题名/关键词=脂肪间充质干细胞)+(题名/关键词=脂肪干细胞)*(题名/关键词=骨再生)+(题名/关键词=骨修复)+(题名/关键词=骨折愈合)).

Participant or population: The experimental material is rabbit. Each rabbit used a small two-way vibration saw to form a 15 mm radius segmental periosteal defect. After resection, adipose stem cells and various cell scaffolds were implanted into the defect, and the experimental group and control group were set up.

Intervention: Each rabbit used a small two-way vibration saw to form a 15 mm radius segmental periosteal defect. After resection, adipose stem cells and various cell scaffolds were implanted into the defect, and the experimental group and control group were set up.

Comparator: Radiographic analyses with X-ray machine; Histological analyses with microscope; Statistical analyses with Statistical software.

Study designs to be included: First, customize relevant retrieval strategies, then formulate relevant literature inclusion and exclusion criteria, and finally retrieve CNKI, China National Knowledge Infrastructure (hereinafter referred to as CNKI), Wanfang Data (hereinafter referred to as Wanfang), VIP database (hereinafter referred to as VIP), CBMdisc, China biology medicine disc (hereinafter referred to as CBM), PubMed, EMBASE Cochrane Library and other databases comprehensively searched the randomized controlled trials (RCTs) of adipose derived stem cells in the

treatment of bone defects. The retrieval time limit was fr.

Eligibility criteria: 1. Inclusion criteria: (1) experimental studies on the efficacy of adipose derived stem cells in the treatment of rabbit bone defect models published by may 2022; (2) The length of artificial bone defect should be at least 1.5cm; (3) The original data are specific and detailed, and there is no difference in the general situation of the research objects; (4) Literature, whether blind or not; (5) the language is limited to Chinese and English. 2. Exclusion criteria: (1) documents whose intervention measures do not meet the requirements; (2) unable to extract data and literature; (3) exclude letters, conference documents, systematic evaluation and case reports; (4) randomized controlled trials with high risk of bias; (5) the research of the same author or unit has been published for many times, excluding the earliest research and taking the last one to ensure the latest experimental data.

Information sources: Obtain the literature of relevant experiments from (CNKI, China National Knowledge Infrastructure), (Wanfang Data), (VIP database), (CBMdisc, China biology medicine disc), PubMed, EMBASE, Cochrane Library and other databases, When the required data is unclear or missing, we contact the author.

Main outcome(s): The rabbits in each group were evaluated by imaging and histological analysis at different time periods.

Quality assessment / Risk of bias analysis: The Cochrane risk bias assessment tool was used for bias risk assessment.

Strategy of data synthesis: After extracting the required data, Revman 5.4 and Stata software are used for data synthesis processing.

Subgroup analysis: Use Revman 5.4 software to conduct subgroup analysis and make forest map.

Sensitivity analysis: If heterogeneity is found in the analysis, Revman 5.4 software is used for sensitivity analysis to evaluate the source of heterogeneity.

Country(ies) involved: China.

Keywords: Adipose stem cells; Cell scaffold; Bone defect.

Contributions of each author:

Author 1 - Xiong yongbin - Author 1 drafted the manuscript, collected data, processed the data and wrote the text.

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Author 2 - Li chunliang - The authors provide expertise on adipose stem cells.

Author 3 - Liu junhao - The author participated in the extraction of literature data and statistical processing.

Author 4 - Han xuelai - The author read, provided feedback, and approved the final manuscript.

Author 5 - He yonghao - The author participated in data collection and processing.